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ABSTRACTS FROM THE ORIGINAL PAPERS.

Studies on Proteins. (III).

Alkali Caseinates

By. Kinsuke KONDO.

(Contribution No. 3. from the Laboratory of Nutritional Chemistry, Department of Agriculture, Kyoto Imp. University) (Received sept. 13th 1925)

A. In this section the author made a short discussion of the works on alkali caseinates which already done by Laquer and Sackur, Robertson and Pauli. Examining these results, we can find that the alkali caseinate solutions employed by them are not able to hold the constant physico-chemical nature even during the experiment. It is therefore, not to be wondered at that the conclusions hitherto done on this problem present a motley picture. In the author's opinion, such simple views of the constitution of protein solutions as those based on the Ostwald law of dilution, for instance, can hardly survive the test of experiment; we may indeed, assert that measurements of conductivity, in the present state of of our knowledge as to theory of solution, are the most difficult of all physico-chemical measurements to deal with, with the sole exception of viscosity measurements.

Nevertheless, it is possible that a few measurements I have made, partly of viscosity, and partly of conductivity in casein solution, may be of some interest.

B. The method used for the preparation of alkali caseinate solution was described. By this method we can prepare the casein solution, which is not only constant and reproducible, but also does not alter their condition in course of time, as long as the quantity of base added is small. This is confirmed by determination of viscosity and conductivity in the solutions. Moreover, the determination of PaH-value and viscosity in alkali caseinate solutions of different concentration of base suggests that the casein is decomposed by the only excess of base, which is confirmed by determinations of formol–titrable nitrogen. These are contrasted with those of Pauli.

C. Under presupposition that we may perhaps follow Pauli in comparing the alkali caseinate solution with a solution of a typical neutral salt, we calculate the quantity $\alpha = \frac{M}{M_\infty}$, and the mobility of casein ions which results 50.45 in the units of equivalent conductivity. The high value α distinctly suggests that the alkali caseinate is a completely dissociated electrolyte. This confirms the opinions of J. Loeb, W. Pauli, S. P. L. Sörensen.

D. (a) Determination of the base–binding power of casein on addition of NaCl and NaOH in varying quantities, revealed a rise in the activity of hydrogen ions with the concentration of sodium chloride with constant quantity of base. This is analogous for instance, to the behavior of acetic acid under similar conditions, and can at any rate in part, be explaind by the activity theory.

(b) Measurements of osmotic pressure and membrane potential in sodium caseinate solutions reveal an extremely high degree of influences exerted by sodium chloride on both osmotic pressure and membrane potential. A brief reproduction is given of a theory for the relation between concentration of sodium chloride, osmotic pressure and membrane potential, a theory closely allied to that of Donnan, and with a very restricted sphere of validity, but nevertheless seeming to show that the molecular weight of casein is very high.

(July, 2nd 1925.)

The Behaviour of Proteases on Amylases, in special Reference to the Chemical Nature of Amylases.

By Shokichi Kato.

(Received, Sept. 15th, 1925)

It is very difficult to know to which class of chemical bodies any enzyme belongs, by direct chemical analysis even of the purest preparations known as yet. The action of one enzyme to another might, however, give us some clew in deciding this question.

Puplications dealing with the behaviour of proteases on amylases, thitherto appeared, have agreed in that the latter is easily decomposed by pepsin, though the action of trypsin is very doubtful.

The author has entered on this study to decide the questions, (1) what is the real cause of the inactivation of amylases by the action of pepsin, (2) how act koji–protease and Bac. subtilis–protease on amylases, (3) whether different amylases are similarly acted by any protease, and (4) whether any evidence can be obtained in concerning with the chemical nature of amylases.

The summary of the experimental results may be given as follows.

1) Salivary amylase is stable at nearly neutral reaction, but easily inactivated irreversirely at the acid side of p_H about 4.2, irrespective of the presence of pepsin (or any protease).

2) In an insufficiently buffered acidic medium containing digestible protein, the acidity increares, as the peptic digestion proceeds. The inactivation of salivary amylase, in such a case, is caused or accelerated by the high concentration of hydrogen–ion, apparently by the direct action of pepsin.

3) But, when the medium is buffered heavily, pepsin shows no effect upon the inactivation of salivary amylase.

4) Salivary amylase is inactivated by none of trypsin, koji–protease and Bac. subtilis–protease even at the resctions nearly optimal for respective protease.

5) The above statements may be given similary on koji–amylase, so far as the experiments are concerned.

6) In short, amylases are not destroyed by proteases. It was perhaps natural that the workers, who did not take into account the above mentioned influence of acidity upon amylases mere led to an errorous conduction.

7) The fact that amylases are indifferent to proteolytic action may be regarded as one of the evidences on the non–protein nature of amylases, though it may not be conclusive.

On Vitamin-A in Green Tea.

by Raizo YAMAMOTO.

(Received, 9th Nov. 1925)

The author observed that green tea contains a fairly large amount of vita–

min–A, while black tea almost lacks this complex.

For the isolation of vitamin–A, 1 kg. of finely powdered sample was mixed with 2500 c.c. of a 10% alcoholic potash solution and let it stand for 4–5 days at ordinary room temperature, being stirred from time to time. It was then filtered, and the filtrate was mixed with 2500 c.c. of a 15% alcoholic $CaCl_2$ solution, the precipitate thus formed was filtered off, and carbonic acid gas was passed into the filtrate to remove the excess of calcium hydroxide as calcium carbonate, which carried down colouring matters and other impurities with it. A brown coloured solution obtained by filtering off the carbonate was evaporated under diminished pressure. The residue therefrom was extracted with benzene (B. P. 40–50°); the benzene solution was washed with dilute hydrochloric acid, caustic potash, and water, successively; and dehydrated with dry sodium sulphate. On evaporating off the solvent, a brown coloured syrup was obtained, which possessed a high potency of vitamin–A. A daily dosis of 0,0125–0.0065 gram of this substance was sufficient to induce the normal growth of albino rats. For the curative purpose, twice as much was required. The yield of the raw syrup was 0.1–0.2% of the original sample. It contained still some carotin and other impurities.

The raw syrup gave almost the same colour reaction as "Biosterin," i. e. it gave the characteristic blue colouration with conc. H_2SO_4, Fuller's earth, or with Jendrassik's reagent etc. It acted upon the photographic dry plate in perfect darkness, which property was also shown by original green tea, though in far weeker degree.

The author observed also that the green tea, when caffeine and tannine were removed, was still effective in promoting the growth of albino rats.